

## POINT, LINE, AND PLANE POSTULATES

Postulate 5 Through any two points there exists exactly one line.

Postulate 6 A line contains at least two points.

Postulate 7 If two lines intersect, then their intersection is exactly one point.

Postulate 8 Through any three noncollinear points there exists exactly one plane.

Postulate 9 A plane contains at least three noncollinear points.

Postulate 10 If two points lie in a plane, then the line containing them lies in the plane.

Postulate 11 If two planes intersect, then their intersection is a line.

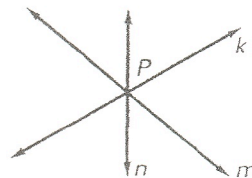
### Example 3 Using Postulates and Counterexamples

Decide whether the statement is *true* or *false*. If it is false, give a counterexample.

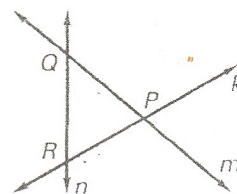
- A point can lie on more than two lines.
- Three lines can intersect at no more than three distinct points.
- If two lines are coplanar, then they intersect.

#### Solution

a. In the diagram at the right, point  $P$  is the intersection of line  $k$ , line  $m$ , and line  $n$ . So, it is true that a point can lie on more than two lines.



b. In the diagram at the right, line  $k$  and line  $m$  intersect at point  $P$ , line  $m$  and line  $n$  intersect at point  $Q$ , and line  $k$  and line  $n$  intersect at point  $R$ . There are no more possible intersections. So, it is true that three lines can intersect at no more than three distinct points.



c. In the diagram at the right, line  $m$  and line  $n$  are coplanar, but they do not intersect. So, it is false that if two lines are coplanar, then they intersect.

